SRAP
Smallholder Rubber Agroforestry Project
ICRAF/GAPKINDO/CIRAD

JAMBI PROGRESS REPORT
NUMBER 3/96
AUGUSTUS 1996

R.A.S. ON FARM EXPERIMENTATION

October planting campaign preparation

Eric Penot, ICRAF/CIRAD-CP
SRAP TEAM in Muara Bungo

Augustus 1996

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1 OBJECTIVE OF THE MISSION

The objectives were the following :
- to monitor the plot situation regarding the wnew trials to be planted in October 1996
- to release the up to date trials protocoles
- to check the old trials planted in december 1995 and see the effect of wild animals (monkeys) on growth and rubber growth.
- to organize the staff activities for the next 3 months.

2 RAS TRIALS SITUATION

2.1 PLOT FILE for all fields/rep.

It is reminded that all fields/rep should have a plot file with all relevant information on the plot. All information should be collected by SRAP staff, written in the plot file, under the supervision of thefield manager who keeps the file at the office.

2.1 VILLAGE OF SEPPUNGUR

RAS on farm experimentation

RAS 2.2 trial : MODIFICATION OFTHE TRIAL:

RICE TRIAL :
Due to the failure of Pak Adnan to prepare in time the fields for a rice trial, the rice trial is implemented in 3 locations :

- in Alias's field / 1 rice variety : SAIM
- in Saer's plot without associate trees : /1 rice variety : SAIM (with the SAIM/CRIFC treatment outsided the plot.
- in the new RAS 2.5 trial in SPM. with SAIM and Wayararem.

Rice trial will be based on 2 varieties (local/SIAM and Wayararem or Jatiluhur) and 3 levels of fertilisation : 0, BPS recommendation, CRIFC recommendation (see RAS 2.2 trial protocole).
Statistical analysis will be done first on the 3 plots with SAIM : one treatment on rice fertilization with 3 rep. The second analysis will be done on the RAS 2.5 rice experiment with 2 treatments : variety x rice fertilization and 1 rep only.
The rice trial is statiscally different from RAS 2.2 analysis.
Only the first 2 fields are part of RAS 2.2. The rice trial is statisticaly analysed alone without connection to RAS 2.2 and RAS 2.5.

The RAS 2.2 is now implemented with a serie of plot with 1 or 2 rep as shown in the RAS 2.2 trial protocol in anex 1 and in the folowing table.

NOTE :
- 30 rubber seedlings close to pak Saer's plot will be selected for growth monitoring to compare clones and seedlings growth in same conditions.
- a new block of 30 trees has been selected in Saer's plot for growth monitoring.
this is to take into account that the palawija composition isdifferent in plot B(new block) and plot C, noted palawija1 and palawija2.

Yani's plot is reintegrated in RAS 2.2 as 2 rep with and without associated trees with another palawija composition noted palawija3.

FIELDS CONDITIONS

farmer	Rice in 96/97	Palawijas growth	Cassava	Associated trees, natural growth	Weeds	ALANG²
Saer	rice in plot A	+++	++	+++	0	0
Sabri		++	+	0	0	0
Sabran		no more		++	0	0
Adnan 1/GT 1	alang²	0	0	0	+++	+++
Adnan 2 PB 260	alang²	0	0	0	+++	+++
Alias	rice	+		+, partly dead	0	0

RUBBER GROWTH

farmer	growth (payung)	growth between payung	weeds	simpai attacks	assessment of delay in growth in months	FIELD NOTE
Saer	+++	+++	0	0	0	5
Sabri	++	++	0	-	- 1	5
Sabran	++	+	-	- -	- 2	4
Adnan 1/GT 1	AVG	+	- - -	- - -	-2	1
Adnan 2 PB 260	AVG	AVG	- - -	- - -	- 2	1
Alias	++	++	0	0	-1	5

2.2 RAS 1/NUTRIENT MANAGEMENT

No particular comment.

2.3 MUARA BUAT and RANTAU PANDAN

RAS 1

The main problem is still the destruction b y monkeys. The situation is critical in Pak Bustami's and Sariono's fields as stumps cannot develop their first whorl and are immediately eaten by

2.4 ; RAS 1/3/rubber fertilization

Due to the interest of some recent fertilization results in West-Sumatra on the use of RP (Rock Phosphate), and the availability of the only RAS 1 plot to be planted in Rantau Pandan, isolated and not in the same condition as that of Seppunggur (where the other fields are located) being free for that purpose : a demo-plot with the 4 treatments (2 rep) will be implemented on that field as following :

Treatments : on rubber fertilization

- ***PLOT A : "0 fertilization",***

- ***PLOT B : " application of high amount of Rock Phosphate (RP) at planting time only*** (1 ton /ha or RP, 27.5 % in the planting hole and 72.5 % broadcast in the field at planting time)

So - in theplanting hole : 500 grams per trees (275 kg/ha)
- broadcast in the field at planting time : 725 kg/ha

- ***PLOT C : selective TCSDP fertilization programme for the first 2 years :*** with 115 grams/tree of SP 36 at planting time and 50 grams/tree of urea every 3 months.

- ***PLOT D : complete TCSDP fertilization programme for the first 2 years*** with SP 36 at planting time and NPK fertilisation every 3 months).

The TCSDP fertilization programme is the following:

IN GRAMMES/tree

	PLANTING TIME October 96	+ 3 months January 97	+ 6 months April	+ 9 months July	+ 12 months October
RP					
UREA		50	50	50	50
SP36	115	40	40	40	40
KCL			40	40	40

The amount of each fertilizer to be supplied to the plots is calculated in anex 2 for each farmer and for each plot.
This trial will be under the direct responsability of Gehardt.

5 ASB/SRAP MUARA BUNGO ICRAF OFFICE ORGANIZATION

activities	*Ratna*	*Iwan*	*Gerhardt*	*Sandy*
Office management Funds management	X			
ordering of inputs supply for old and new trials		X		
Rubber and associated trees growth monitoritng every 3 months	X	X up to end of 1996	X	X First set RAS 1
new trials selection and planting	X	X	X	
P trial in Sepunggur	X			
RAS 1.3/rubber fertilization			X	
Trials weeding and fertilization program monitoring	X	X	X	X for RAS 1 only
Data entry and analysis	X			
Surveys		X		
Budwood garden programme		X		
Relation with the M Bungo school for students working for monitoring activities	X	X	X	
Other ICRAF activities, support	X			

Catherine + Root Cayetitin -

Isabelle ICRAF/ORSTOM Anthropologue
Alexandra
Rien Behrma UNESCO/ICRAF Biodiversité (Fern) Jungle Rubber -

Jl Main

RAS METHODOLOGY

RAS 1.1/WEEDING TRIAL PROTOCOL

Jambi province

MEMO / RAS METHODOLOGY

RAS 1.1/WEEDING

TITLE
Clonal rubber in agroforestry environment : genotype x environment interaction.

OBJECTIVE/HYPOTHESE
OBJECTIVES
- To investigate the growth of an improved rubber clone (GT 1/trial 1 and PB 260/trial 2) in close to jungle rubber conditions, under various intensities of weeding, with emphasis on the critical first 2 years of establishment.

- To compare growth of this clone under currently prescribed 'standard' (theoretically optimal) plantation management conditions (TCSDP technological package), with its growth under three variants of close to jungle rubber management (differing by increasing intensity of weeding on the rubber row). Secondary forest is allowed to grow in the inter-row.

Hypotheses

Main Hypothesis
- Increasing intensity of weeding within the rubber row (compared to that of unselected seedlings) will result in greater growth of rubber due to a decrease in intensity of below-ground competition from regenerating secondary forest species, taking into account the fact that clones required more weeding than unselected seedlings (Note : clones have never been tested in close to jungle rubber conditions).

Secondary Hypotheses
- 1. Increased intensity of weeding only within the row will not affect the regenerative capacity of the useful secondary forest species (e.g : fruits and timber trees, rattan....). E.g. constant disturbance will not preclude the establishment of useful secondary forest species due to e.g. dominance of grasses (or ferns)
(Theoretically this disturbance should not be too detrimental to soil fertility, if slash is left as mulch. Soil is still protected)
- 2. Increased intensity of weeding only within the row will not affect the susceptibility to invasion by Imperata, except on the row.
- 3 Secondary forest regrowth in the inter-row may not be more competitive than a leguminous cover crop used in the inter-row in terms of rubber growth.
- 4 Classical LCC used for rubber are viny species and required more weeding than natural forest regrowth.

EXPERIMENTAL DESIGN

Case 1 : EACH TRIAL IS PROCESSED SEPARATELY with respectively 5 and 6 rep. Randomized block system : if we consider that GT1 and PB 260 are "clonal planting material". (5 rep). In that case, clone is not a treatment.

.Case2 : TRIAL 1
as the 2 clones do not have the same growth behavior, and are planted at different time : I suggest a split plot design with 'clone' as a sub treatment (2 rep for GT1 and 3 rep for PB 260).

RUBBER
FERTILIZATION

Simplfied TCSDP fertilization programme with SP 36 at planting time (115 grams per tree) and UREA (50 grams per tree, every 3 months) only for the first 2 years. No fertilization later.

RUBBER PLANTING DISTANCE

Standart : 550 trees/ha : 3 x 6 meters.
Rantau Pandan (Pak Azari and Ismael) have been planted with GT1.
Muara Buat :Pak Bustami and Sariono (2 rep) have been planted with PB 260
Clone is not a treatment in that trial.

INTERCROPPING

TRIAL 1 : Local rice the first year (Pak Azari's plot but rice failed) or no crop (all other plots).

TRIAL 2 : no intercropping.

INTER ROW DURING IMATURE PERIOD

The secondary forest (belukar) is allowed to grow at the conditions that trees and shrubs do not reach a height greater than that of rubber (selective cutting if necessary).

PLOT SIZE : 1000 m²
NUMBER OF PLOTS PER REPLICATION : 4 plots
REPLICATION/FARM SIZE : 4 000 m²
NUMBER OF REPLICATION
TRIAL 1 : 5 (2 with GT 1 and 3 with PB 260)
TOTAL SIZE OF THE TRIAL : 2 ha

TRIAL 1
Planting : 12/95

PLOT MAP

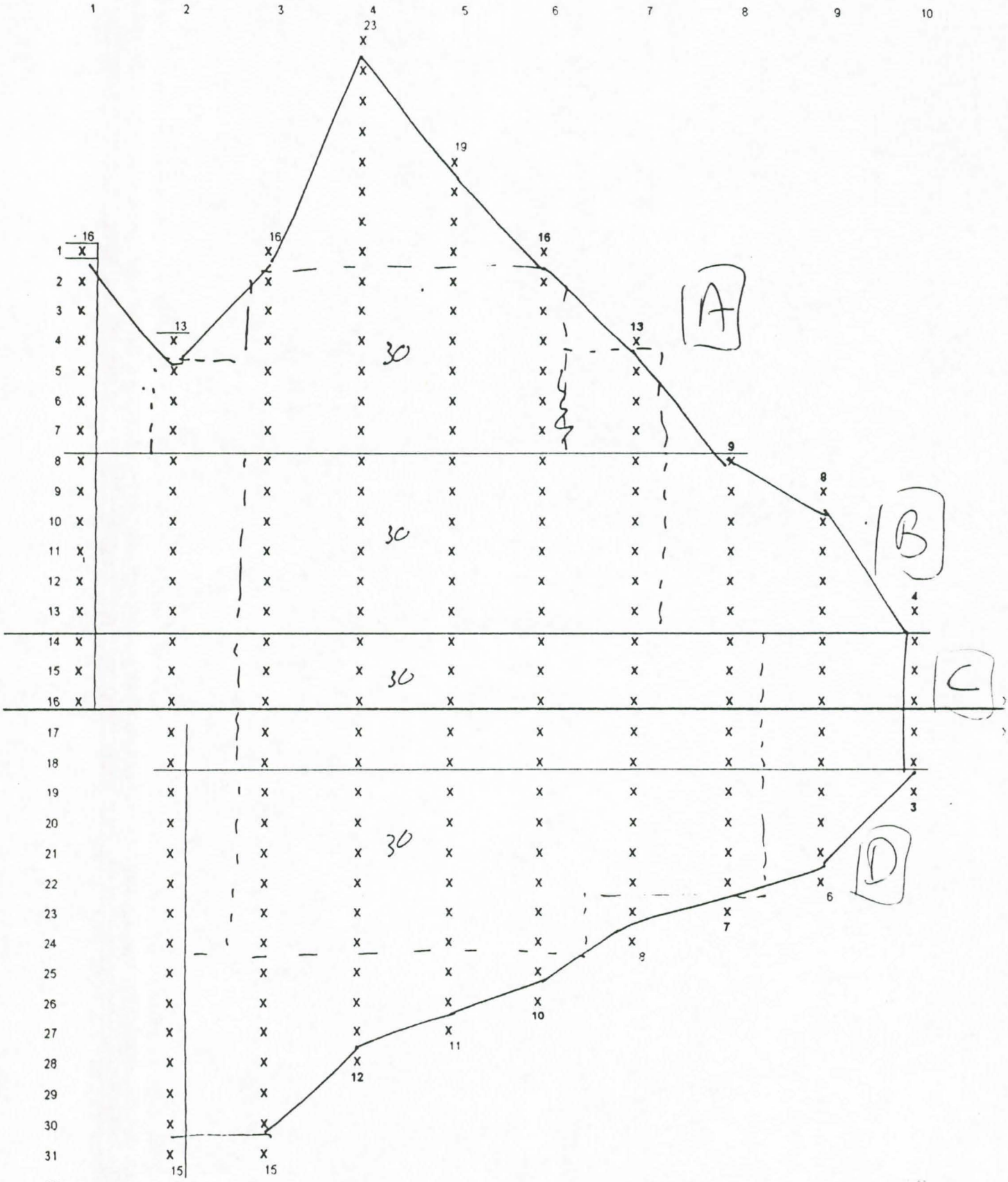
TRIAL RAS 1
FARMERS BUSTAMI/KDES
VILLAGE MUARA BUAT

Top — slope — Bottom.

1	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X
3	X	X	X	X	X	X	X	X
4	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X
7	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X
11	X	X	X	X	X	X	X	X
12	X	X	X	X	X	X	X	X
13	X	X	X	X	X	X	X	X
14	X	X	X	X	X	X	X	X
15	X	X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X
17	X	X	X	X	X	X	X	X
18	X	X	X	X	X	X	X	X

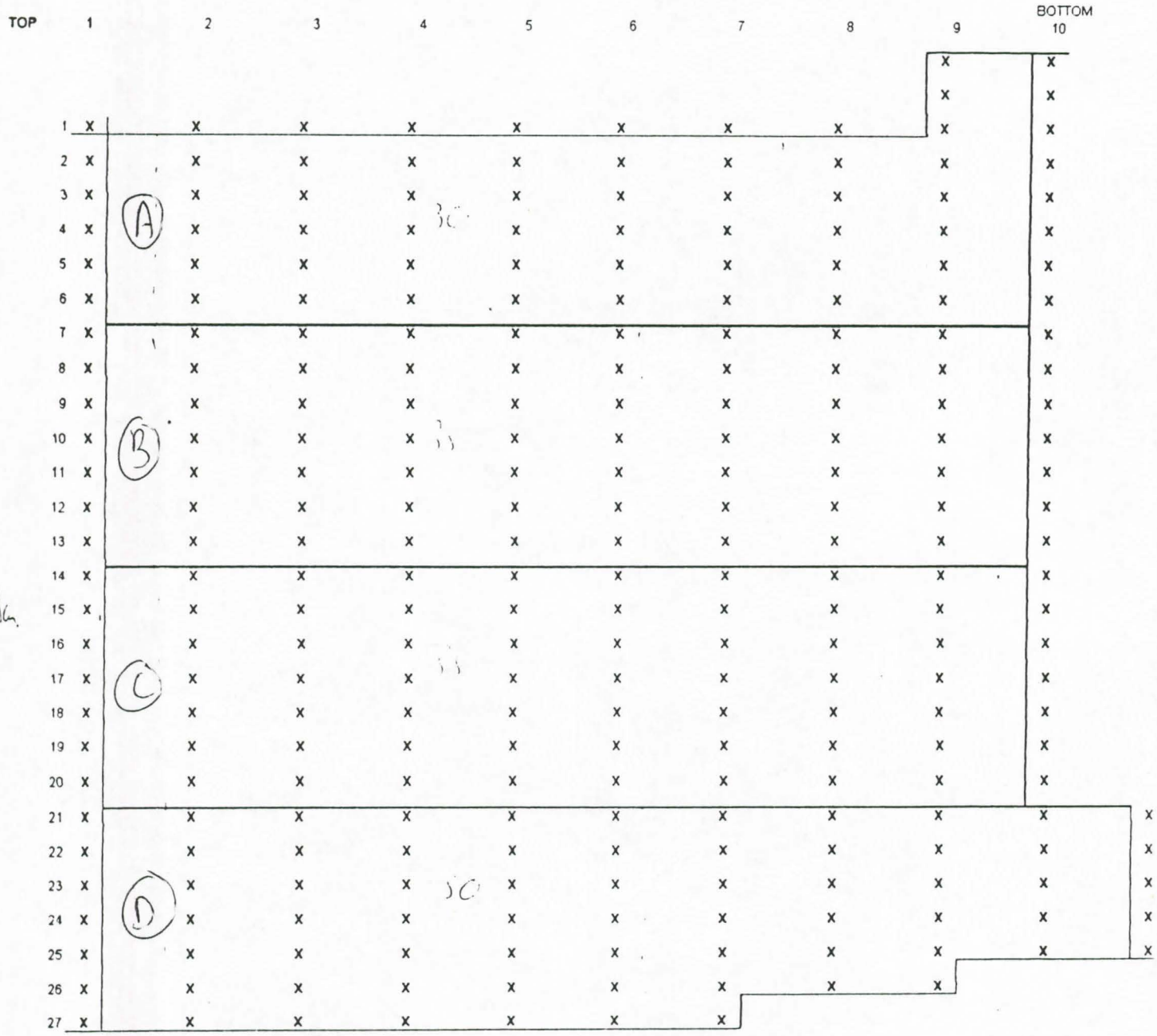
PLOT MAP 2nd possibility

TRIAL RAS 1
FARMERS AZARI
VILLAGE RANTAU PANDAN



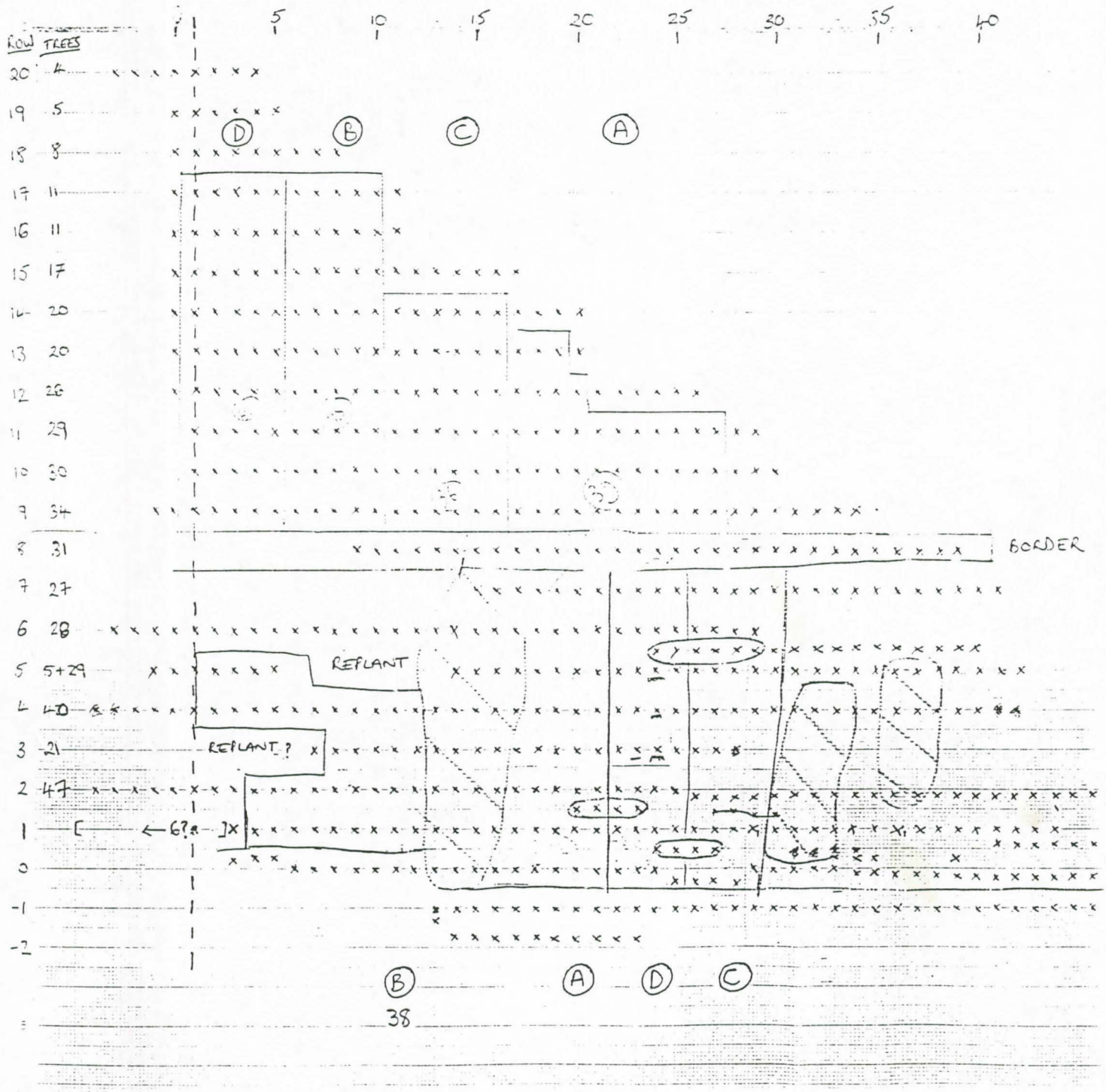
PLOT MAP

TRIAL RAS 1
FARMERS ISMAEL
VILLAGE RANTAU PANDAN



Duran Brook

SHRYONO



TRIAL 2
Planting : 10/96

PLOT RANDOMIZATION FOR TRIAL 2 : planting in October 1996

1 PAK AZUAR

9X D	6X C	3X B	9X + LCC A

Jalan.

2 PAK ALJUPRI

9X D	9X + lcc A	6X C	3X B

Jalan.

3 PAK ZULKIFLIN AND 4 PAK SARONI

9X + LCC A	9X D
9X D	3X B
3X B	6X C
6X C	9X + LCC A

JALAN

5 PAK eman

3X B	6X C	9X D	9X + LCC A

Jalan.

6 PAK ABDULRONI

RAS 1.1

3X	6X	9X	9X + LCC
B	C	D	A

plot RAS 1.2

Jalan

RAS METHODOLOGY

RAS 1.2/CLONE COMPARISON TRIAL PROTOCOL

JAMBI

RAS 1.2/CLONE COMPARISON

TITLE

Clonal rubber and unselected seedlings in agroforestry environment : genotype x environment interaction.
2 treatments : Clone comparison (4 clones + seedlings) with 2 levels of weeding.

OBJECTIVE/HYPOTHESE

OBJECTIVES

- To investigate the growth of 4 improved rubber clone (with PB 260 and unselected seedlings as controls) in RAS 1 environment (close to jungle rubber conditions), under 2 intensities of weeding, with emphasis on the critical first 2 years of establishment.

Hypotheses

Main Hypothesis

- Increasing intensity of weeding within the rubber row (compared to that of unselected seedlings) will result in greater growth of rubber due to a decrease in intensity of below-ground competition from regenerating secondary forest species, taking into account the fact that clones required more weeding than unselected seedlings (Note : clones have never been tested in close to jungle rubber conditions).
- it is necessary to rely on several clones rather than only one to limite risks and increase adaptability of clonal planting material in jungle rubber conditions. It may be expected that jungle rubber conditions increase the risk of leaf diseases compared to that of monoculture due to higher moisture level and microclimatical conditions more favourable to fungus development.

Some clones may be more adapted than other for RAS 1 among those 4 clones which have been selected for all RAS trials. The performances of clones will be compared to that of unselected seedlings and PB 260 which is considered as the clone benchmark.

EXPECTED OUTPUTS

- To produce recommendations on clonal recommendations in RAS 1.

LOCATION : Jambi, Kamubaten Muara tebo.
Also in West-Kalimantan province, Kabupaten Sanggau, Kecamatan Sanggau kapuas, villages of Embaong.
Total 6 replications for october 1996 planting.

YEAR :
In polybag : july 1996 with Goodyear planting material in West-Kalimantan and Jambi.
planting of rubber : October 1996

DURATION
5 to 6 years for immature period. The first 2 years are critical in terms of growth and survivability. Then, if possible, a minimum of 3 years of production monitoring.

MATERIALS AND METHOD

DESIGN : 10 plots
Treatments

Treatment 1 : clones (4) and unselected seedlings (1) : 5 type of planting material
Treatment 2 : weeding intensity : 3 and 6 weeding/year (4 and 8 weedings/year in West-Kalimantan).

TRIAL DESIGN

PB 260 3weeding/year	RRIC 100 3 weeding/year	BPM 1 3weeding/year	RRIM 600 3 weeding/year	Unselected seedings 3 weedings/year
PB 260 6weeding/year	RRIC 100 6weeding/year	BPM 1 6weeding/year	RRIM 600 6 weeding/year	Unselected seedings 6 weedings/year

The 2 series of clones and unselected seedings will be randomized in the strip. The 2 strips are randomised (strip split plot design). For the farmer ; only 2 visible plots with 2 levels of weeding. Level of weeding is not fully randomized for pratical reasons.

EXPERIMENTAL DESIGN
Strip split plot with main treatment on clones, secondary treatment on weeding level. Control is PB 260 plot.

RUBBER
CLONES
Fast growing clones : PB 260 and RRIC 100

		3x	6x3
PB 260	A	A_1	A_2
RRIC 100	B	B_1	B_2
BPM 1	C	C_1	C_2
RRIM 600	D	D_1	D_2
Seedlg.	E	E_1	E_2

PLOT RANDOMIZATION FOR JAMBI

1 pak MAOWI

TRENCH EXP	BPM 1	RRIM 600	Seedlings	PB 260	RRIC 100	3X
PB 260	BPM 1	HOLE NOT USED	RRIM 600	RRIC 100	Seddlings	6X

2 PAK HADJI DUR

SEEDLINGS	RRIC 100	BPM 1	RRIM 600	PB 260	3X
BPM 1	PB 260	RRIM 600	RRIC 100	SEEDLINGS	6X

JALAN

3.1 PAK HARARAP : half rep

seedlings	RRIM 600	BPM 1	3X
SEEDLINGS	BPM 1	RRIM 600	6X

RIVER

3.2 PAK YUSUF : half rep

seedlings	RRIC 100	PB 260	3x
PB 260	RRIC 100	seedlings	6X

Jalan

4 PAK TARIDI

PB 260	RRIC 100	RRIM 600	Seedlings	BPM 1	3X
BPM 1	RRIC 100	PB 260	RRIM 600	seedlings	6X

JALAN

5 Pak ABDU[RONI

seedlings	RRIC 200	PB 260	BPM 1	RRIM 600	3X
PB 260	BPM 1	seedlings	RRIM 600	RRIC 100	6X

= Jalan =

RAS 1.3/RUBBER FERTILIZATION TRIAL PROTOCOL

RUBBER FERTILIZATION

JAMBI province

RAS METHODOLOGY

RAS 1.3/RUBBER FERTILIZATION TRIAL PROTOCOL

TITLE
Clonal rubber in RAS 1 type agroforestry environment : rubber + secondary forest regrowth
TREATMENT ON RUBBER FERTILIZATION

OBJECTIVE/HYPOTHESE
OBJECTIVES

Rubber is planted at normal planting density of 550/ha in a RAS 1 type trial (cf RAS 1 protocol).

Fertilization of rubber may be a key factor in the trade-off between fertilization/higher cost of establishment, the level of weeding (studied in RAS 1) and the good and fast growth of trees to compete with the natural forest regrowth in the inter-rows.
This trial is aimed to compare 4 amounts of fertilization on clonal rubber in RAS 1 system.

Hypotheses :

In the specific conditions of Jambi , rubber fertilization may be required to obtain a fast growth performance..
Good rubber growth performance may lead to early opening.

EXPECTED OUTPUTS

To produce recommendations on fertilization component of RAS 1 :
- rubber fertilization management required for successful growth of rubber clone in this environment

LOCATION : Jambi, village of Ratau Pandan

YEAR :
planting of rubber : october 1996

DURATION
5 to 6 years for immature period. The first 2 years are critical in terms of growth and survivability.

RAS 1.3/RUBBER FERTILIZATION : pak maowi

A1	***C2***	***not used***	***D2***	***C1***
B2	***D1***	***not used***	***B1***	***A2***

RUBBER
All rep are planted with PB 260

FERTILIZATION
See the treatments

RUBBER PLANTING DISTANCE
Standart : 550 trees/ha : 3 x 6 meters.

RUBBER WEEDING :

6 weedings ayear , every 2 months, on a regular basis. Local observation and presence of Mikenia or alang² may change that pattern.

INTERCROPPING

No intercropping

ASSOCIATED TREES

No associated trees.

FIELD SIZE per farm

PLOT SIZE : 500 m²
NUMBER OF PLOTS PER REPLICATION : 4 plots
NUMBER OF REPLICATION/farm : 2
OTAL NUMBER OF PLOT PER FARM : 8 plots
NUMBER of FAMS : 1
REPLICATION/FARM SIZE : 4 plots : 4 000 m²

RAS 2.2/PALAWIJA-RICE
TRIAL PROTOCOL

RUBBER + associated trees + intercropping

JAMBI

RAS 2.2 TRIAL PROTOCOL
RUBBER + associated trees + intercropping /PALAWIJA/RICE

TITLE
Clonal rubber in agroforestry environment : rubber + selected associated trees (92 trees/ha) + intercropping (rice or palawijas)

OBJECTIVE/HYPOTHESE
OBJECTIVES

- As in jungle rubber system where rubber seedlings are associated with various kind of trees and plants, RAS 2.2 aims to associate usefull trees (fruits and timber trees) with rubber, at a limited planting density, without subtantial decrease in rubber yield.
- Rubber is planted at normal planting density of 550/ha as associated trees are planted at 92 trees/ha with a maximum number of 30 for big trees (Durian and timber trees).

Hypotheses

- It is expected that rubber growth during immature period will not be affected by associated trees competition as these selected fruits and timber trees have generaly a slow growth pattern (in partticular for durian , local fruits and timber species).
- It is expected that intercropping during the first 3 or 4 years of rubber imature period will create a favourable environment for a good rubber growth due to intercrop weedings and secondary effect of fertilization..
- Intercropping will limit the extend of weeds such as Imperata.

EXPECTED OUTPUTS

To produce recommendations on components of RAS 2.2 :
- weed management required for successful growth of rubber clone in this environment : 6 weedings per year has been proved to be sufficient to ensure rubber growth in Jambi : weeding is not a treatment in RAS 2.2.
- most suitable rice varieties and adapted amount of fertilization.
- the effect of palawijas intercropping on rubber growth.
- distribution of species for associated trees.

LOCATION : Jambi province, Kabupaten Muara Tebo, Kecematan Rantau Pandan, villages of Seppungur (6 rep) and Muara Buat (1 rep)

YEAR :
planting of rubber : December 1995-February 1996

EXPERIMENTAL DESIGN

SUMMARY : 1 treratment : intercropping with 7 levels :

1. Control1 : alang²	2 rep (Adnan1 & 2, plots A)
2 Control2 : no alang², no palawija	2 rep (Sabran, A & B
3. Rubber + rice/dose 0 :	2 rep (Alias A/Saer A)
4. Rubber + rice/dose BPS :	1 rep (Alias B)
5. Rubber + rice/dose CRIFC :	1 rep (Alias C)
6 Rubber + Palawij1	4 rep (Sabri A, Saer B&C, Sabri B
7 Rubber + palawija2	2 rep (Joni A and B)

Randomized block system.
The first 2 years : Associated trees are not a significant treatment.
WEEDING : 6 weedings/ year on the row. (100cm on either side of the trees).

Rice experiment statistical analysis will be processed separately. In that case, rice with or without fertilization is just a "system", a level in the treatment 'intercropping'.

RUBBER

All rep are planted with GT1 except one with PB 260 (due to a problem of plant availability). Clone is not considered as a treatment.

FERTILIZATION

TCSDP fertilization programme for UREA only for the first 2 years. No fertilization later.

RUBBER PLANTING DISTANCE

Standart : 550 trees/ha : 3 x 6 meters.

RUBBER WEEDING :

6 weedings ayear , every 2 months, on a regular basis.

INTERCROPPING

See the levels.

ASSOCIATED TREES

Planting density : 92 trees/ha : 9 x 12 meters.

Case 1 : RAS 2.2/mix : combination of fruit trees.
Case 2 : RAS 2.2/DD : Durian + duku

No fertillization.

RICE EXPERIMENT in RAS 2.2

In Alias and Saer plot A fields :

Rice variety : SAIM (from Sembawa)
Treatment : on fertilization : 3 levels
- dose 0
- dose BPS
- dose CRIFC

"BPS fertilization dose" is the economic dose recommended by BPS/Sembawa for JAMBI.

FERTILIZATION DOSE

DOSE IN KG/HA	UREA	SP 36	KCL
BPS	100	160	75

"CRIFC fertilization dose" is the dose recommended by CRIFC/Bogor for JAMBI.

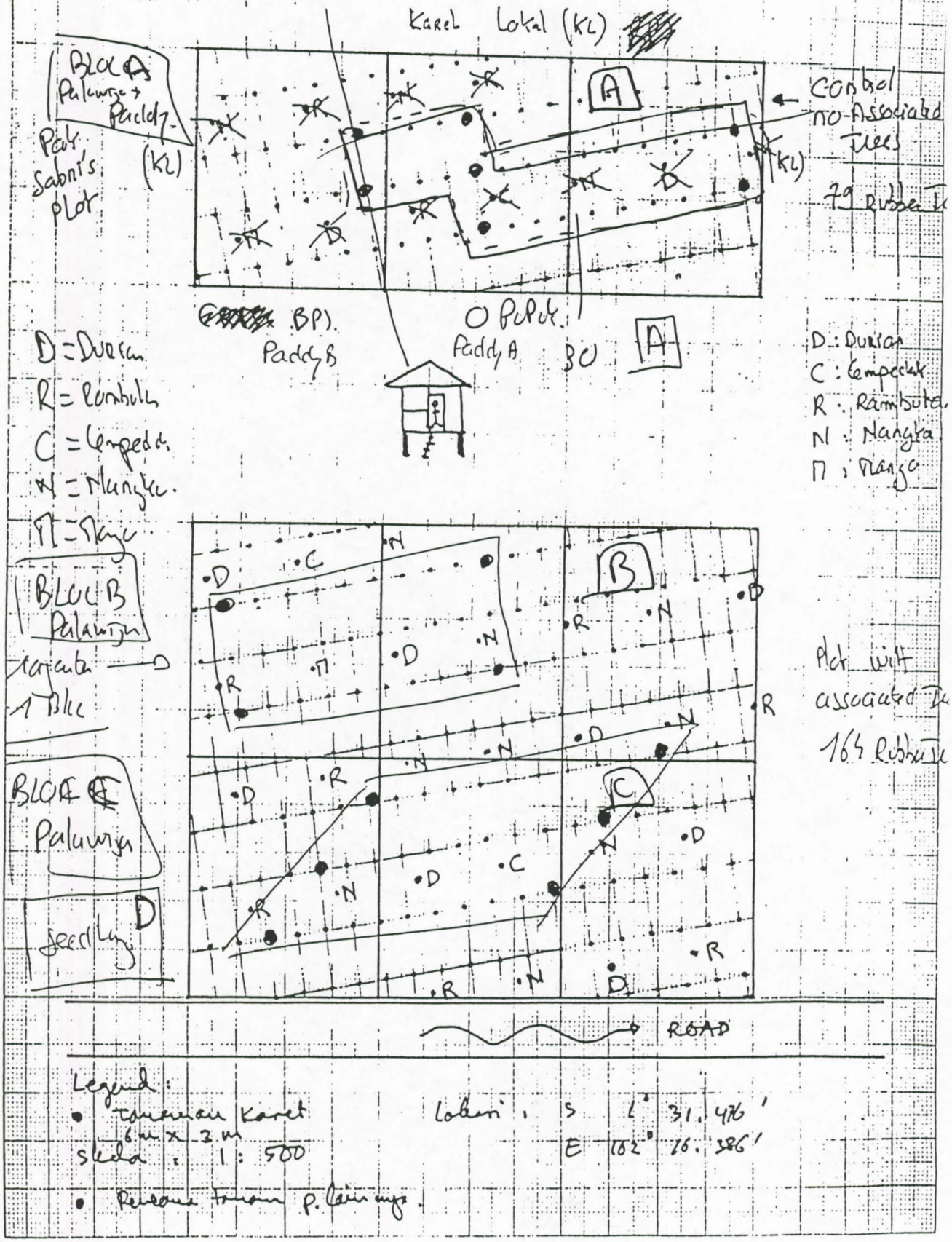
FERTILIZATION DOSE

DOSE IN KG/HA	UREA	SP 36	KCL
CRIFC	150	220	150

Urea is supplied in 3 times : 1/3 at planting time, 1/3 1 month after planting and 1/3 2 months after planting.

1. Pak. Sabri 2.2

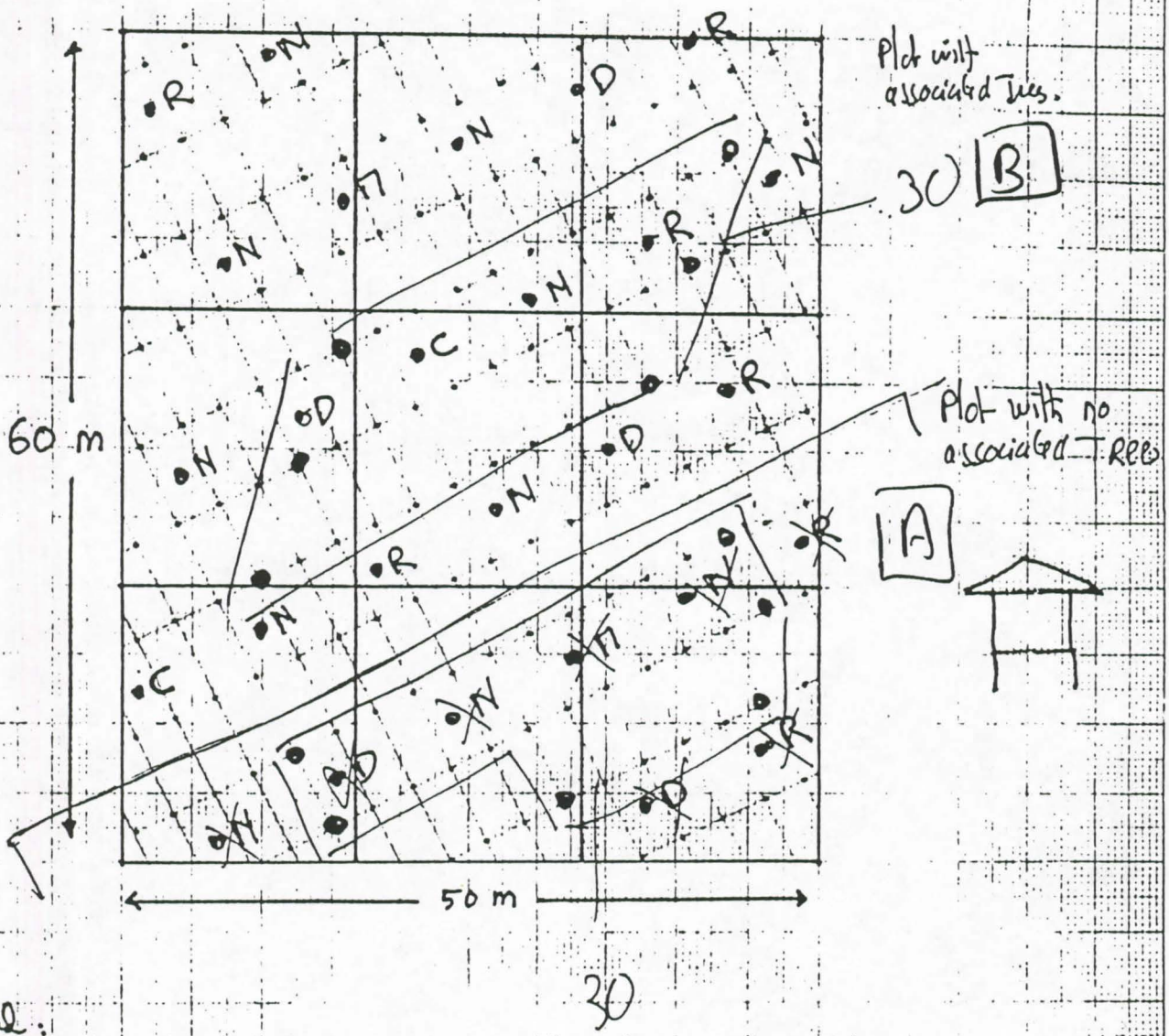
Paddy CCRIF



Legend:

- Tanaman Karet 6 m x 3 m
  Skala : 1 : 500
- Rencana tanam P. Lainnya

Lokasi : S 1° 31.476'
E 102° 16.386'

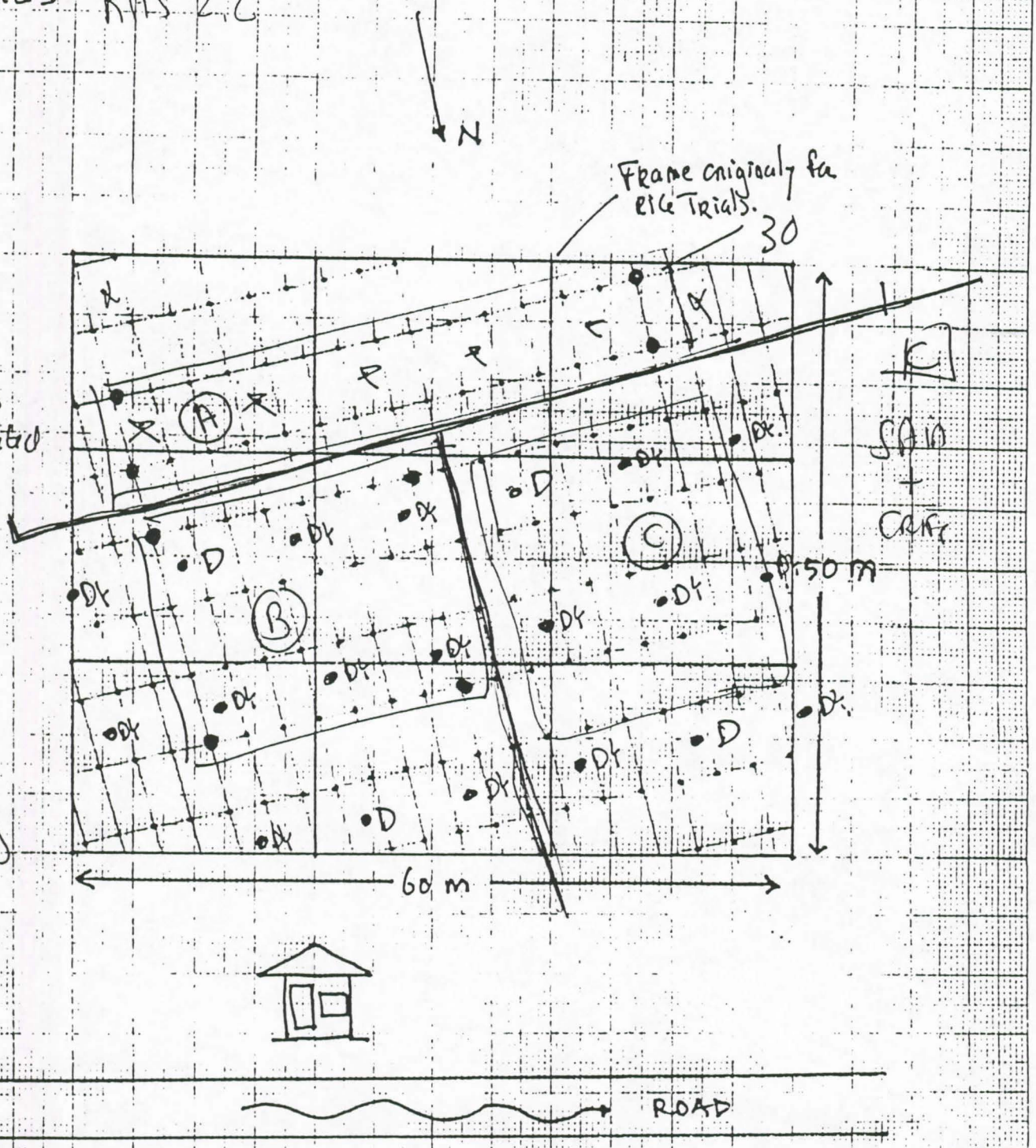


Legend :

- Tanaman Karet
  spree : 6 m x 3 m
  scall : 1 : 500
- Rencana tanaman pelindung dan lainnya.
- 156 RUBBER TREES.

ROAD

Alias RAS 22



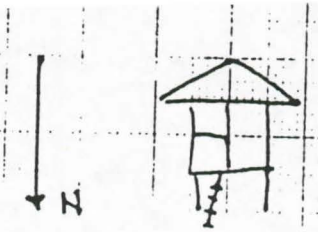
Legend :

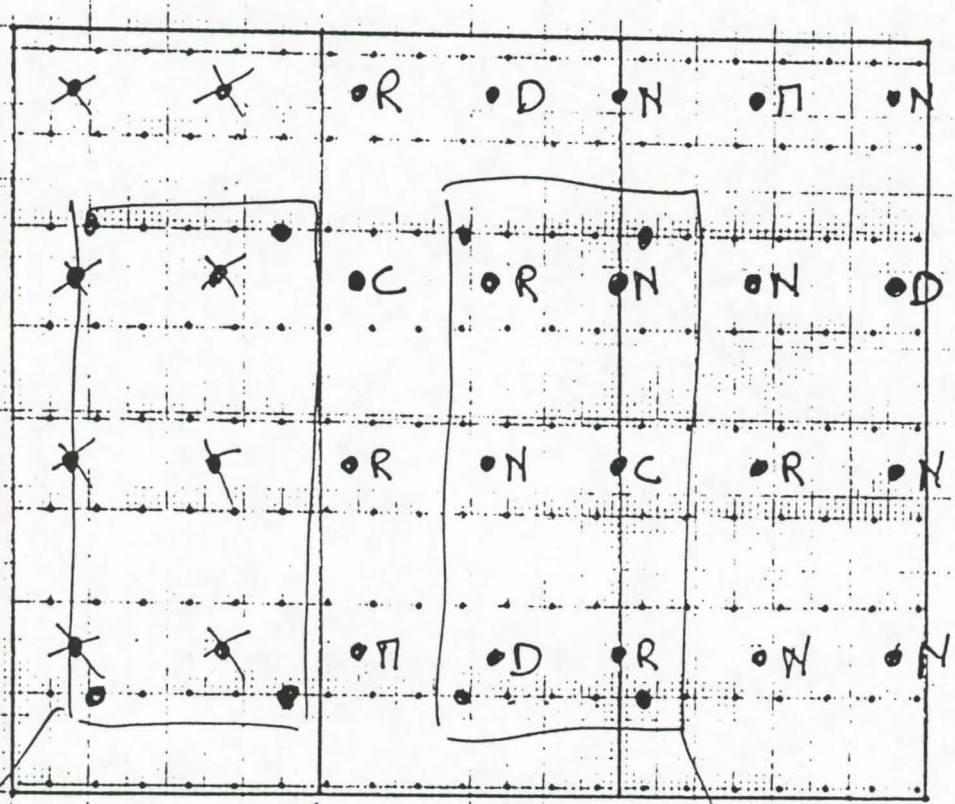
- Tomoon Kanet 6m x 3m.
- Pemanas Tuaran P. Lawing

Skala : 1 : 500

Lokasi : S 1° 31.570'
T 102° 46.592'

Jabran. Kilo 6.6





30

Plot with no associated Trees.

A

Plot with associated Trees.

30

B

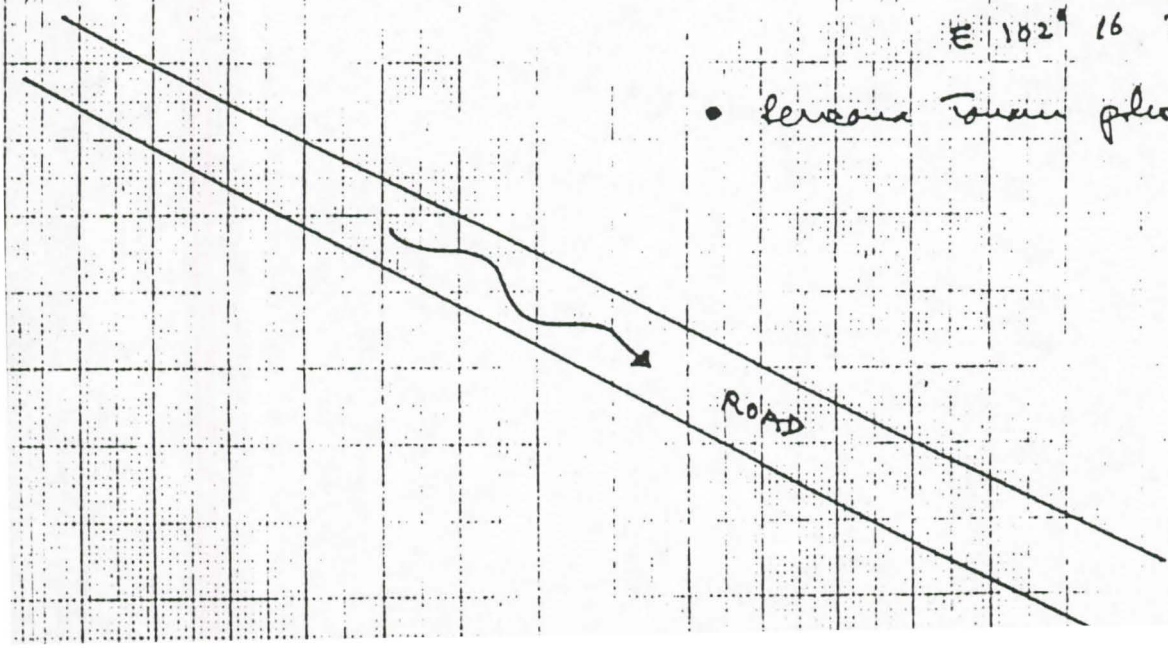
Legend :

Scala : 1 : 500

- Tanaman kopi 6 m x 2 m.

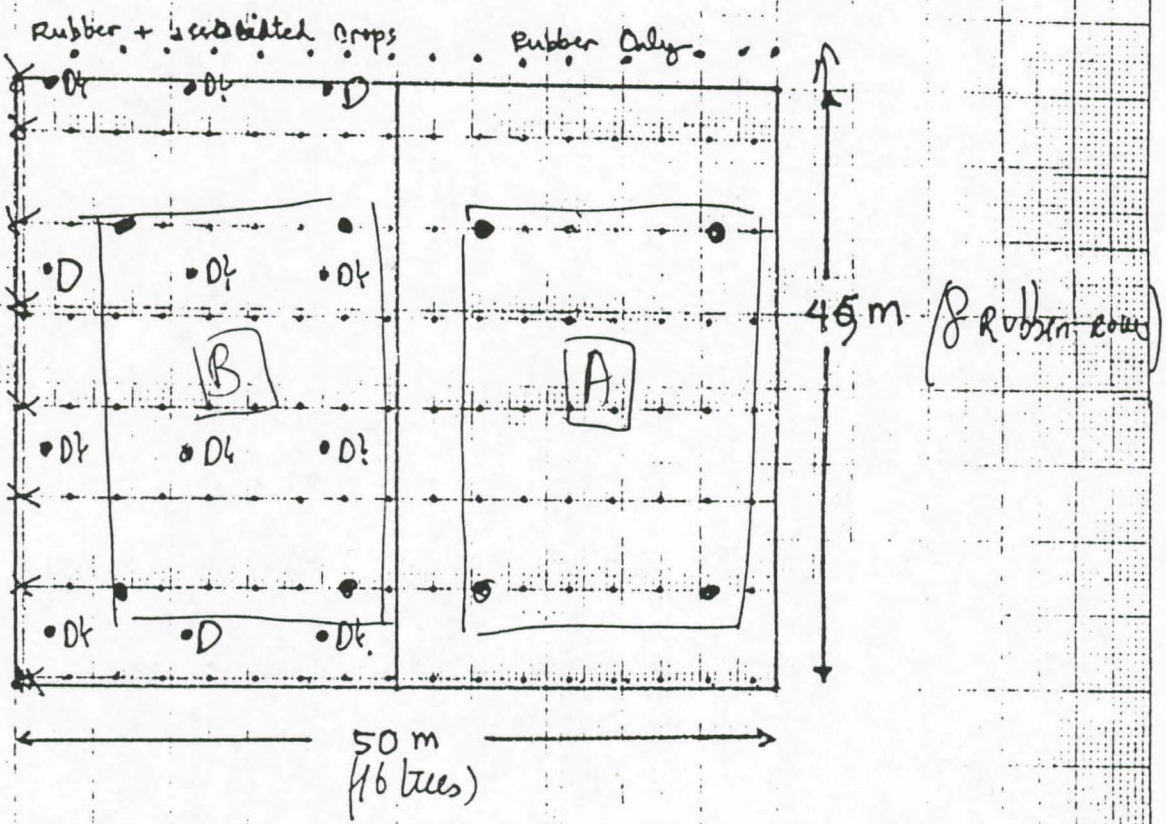
Lokasi : S 1° 31.450'
E 102° 16 303'

- Lereng Tanah pada kemiringan.



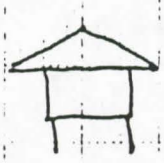
Admin 2 RAS 2.2 / Rice / GTL

GTL



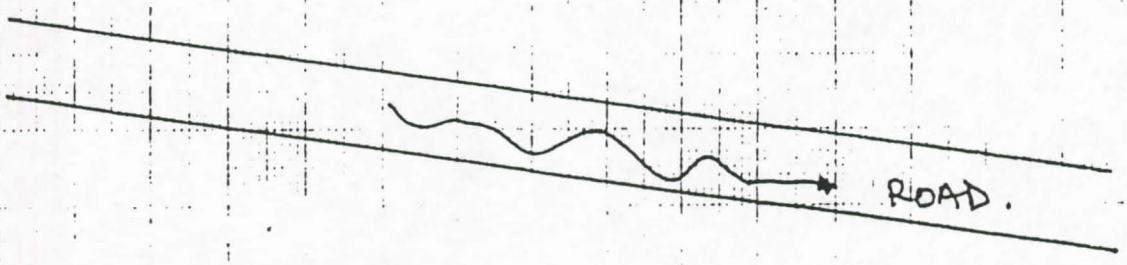
Plot Admin 2

PB 260 →



- Tanaman karet 6 m x 2 m.
- Rencana Tanam p. lainnya

skala = 1 : 500.

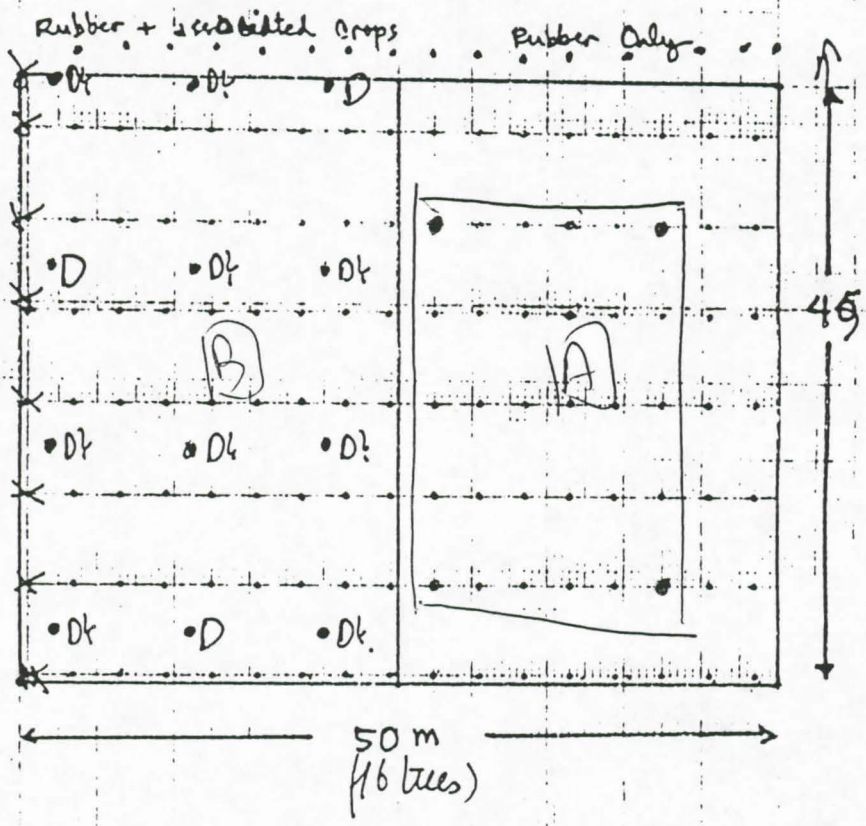


Same with PB 260 → Plot ADMIN 2

5 Adnan 2 RAS 22/Rice/PB260

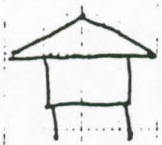
ADNAN 2

PB260



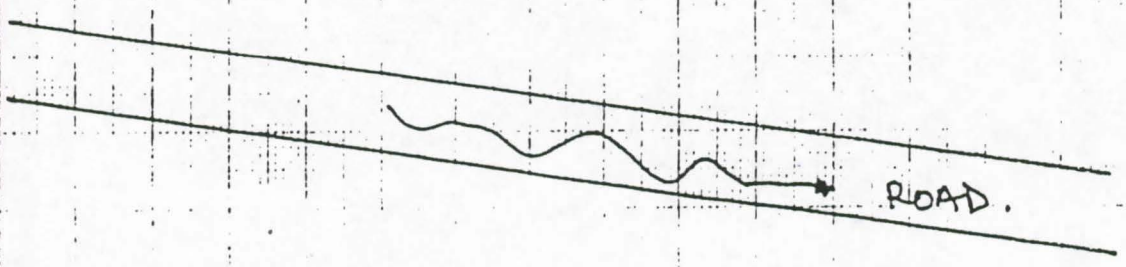
Plot Adnan 2 PB260

(Rubber only)
Plot
Adnan 1

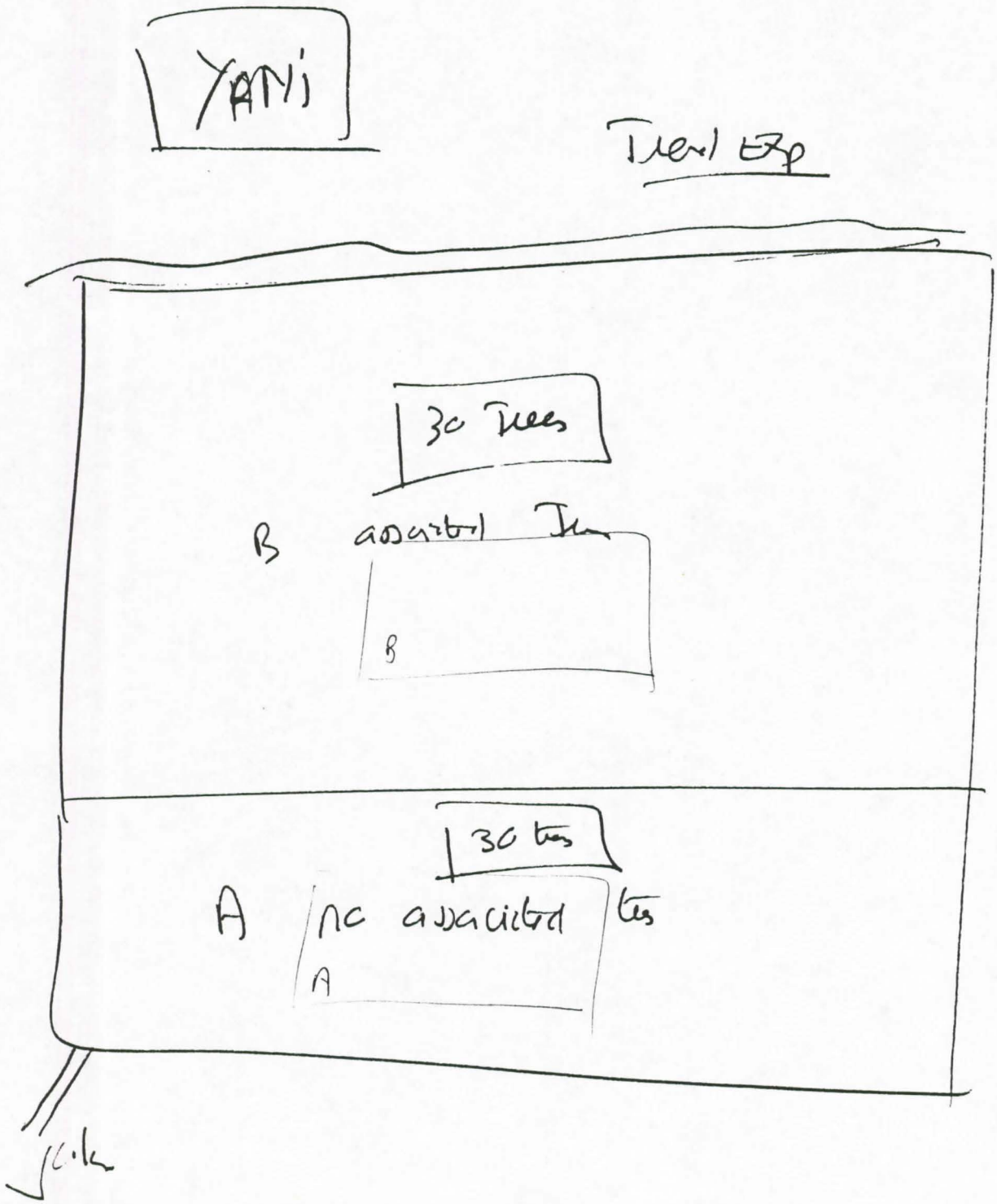


- Tandas kayu 6 m x 2 m.
- Rencana Tanam p. lainnya

skala = 1 : 500.



~~Same with PB260 → Plot ADNAN 2~~


Yani
Trend Exp
30 Trees
B
B
30 trees
A
A

RAS 2.5 TRIAL PROTOCOL

RUBBER + CINNAMON

DURATION
5 to 6 years for immature period. The first 2 years are critical in terms of growth and survivability. Then, if possible, a minimum of 3 years of rubber production monitoring. Cinnamon will be harvested the year 7 or 8.

MATERIALS AND METHOD
Treatments
1. Control: rubber in monoculture, rubber is cropped as in RAS 1 : Weeding on the row. Interrow is occupied by secondary forest regrowth.
2. Rubber + cinnamon: 6 complete weedings/ year.
3 Cinnamon in monoculture

EXPERIMENTAL DESIGN
Randomized block system : 3 rep/trial.

RUBBER

TRIAL 1 / All rep are planted with GT1.
TRIAL 2 / All rep are planted with PB 260

FERTILIZATION
Simplified TCSDP fertilization programme : 115 grams/tree of SP 36 at planting and 50 grams/tree UREA every 3 months only for the first 2 years. No fertilization later.

RUBBER PLANTING DISTANCE
Standart : 550 trees/ha : 3 x 6 meters.

RUBBER WEEDING :
6 weedings a year , every 2 months, on a regular basis, on the row for Rubber monoculture and complete for cinnamon and rubber + cinnamon.

CINNAMON

Planting density : 1111 trees/ha :3 x 3 meters.
No fertillization.
Weeding : same as for rubber monoculture (6 complete weedings/year).

FIELD SIZE

PLOT SIZE for rubber + intercropping : 1000 m^2/1500 m^2
NUMBER OF PLOTS PER REPLICATION : 3 plots

REPLICATION/FARM SIZE : 3000 m²/4500 m²
NUMBER OF REPLICATION = 3
TOTAL SIZE OF THE TRIAL : 0,9 ha/1.35 ha

DATA TO BE COLLECTED

Standart data for all RAS 2.5 :

RUBBER

- rubber growth measurements : diameter, height and worls the first year every 3 months. Then girth the second year every 3 months. Sample of 30 trees per plot.
- Farmer's labour for each plot.
- soil samples per replication on 0-10 and 10-20 cm.

CINNAMON

- tree growth measurements : girth 6 months after planting for a a sample of 30 trees per plot.

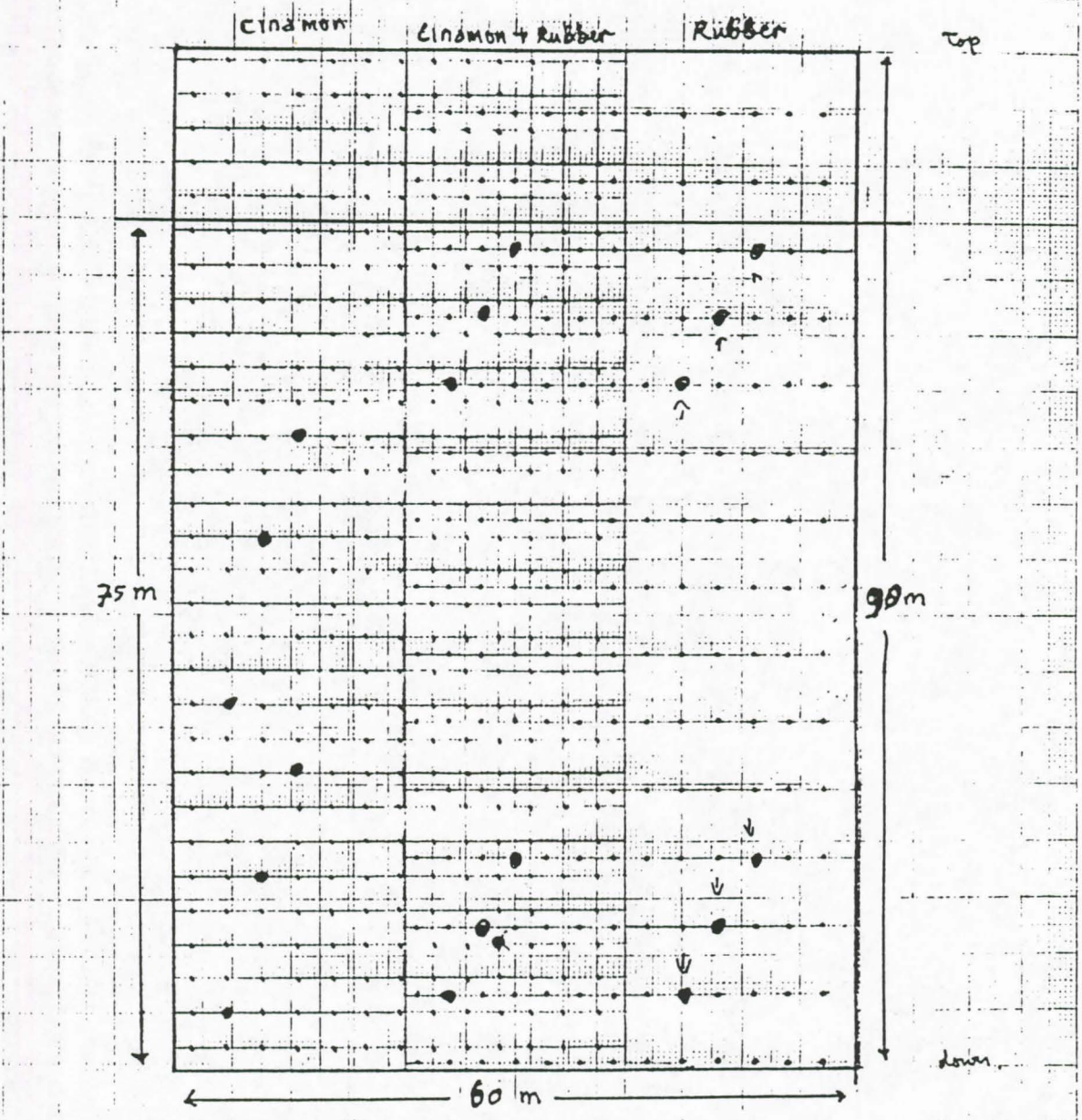
Labour requirements per plot.

TRIAL 1
Planting : 12/95

FARMERS' FIELDS MAP

1. Muara. Buat.

1.1. Pak. Alisri RAS 2.5



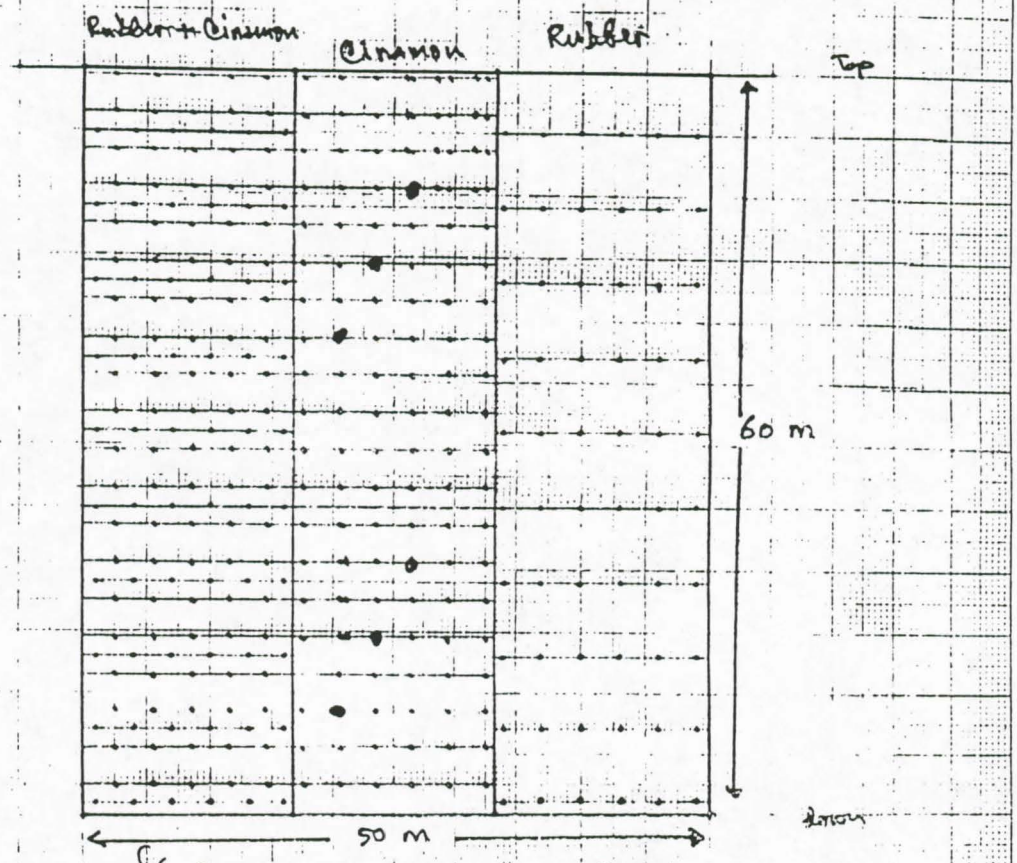
• : tanaman kulit manis 3 m x 3 m

• : tanaman karet 6 m x 3 m

Skala = 1 : 500

RIVER

1.2. Pak. Efendi RAS 2.5



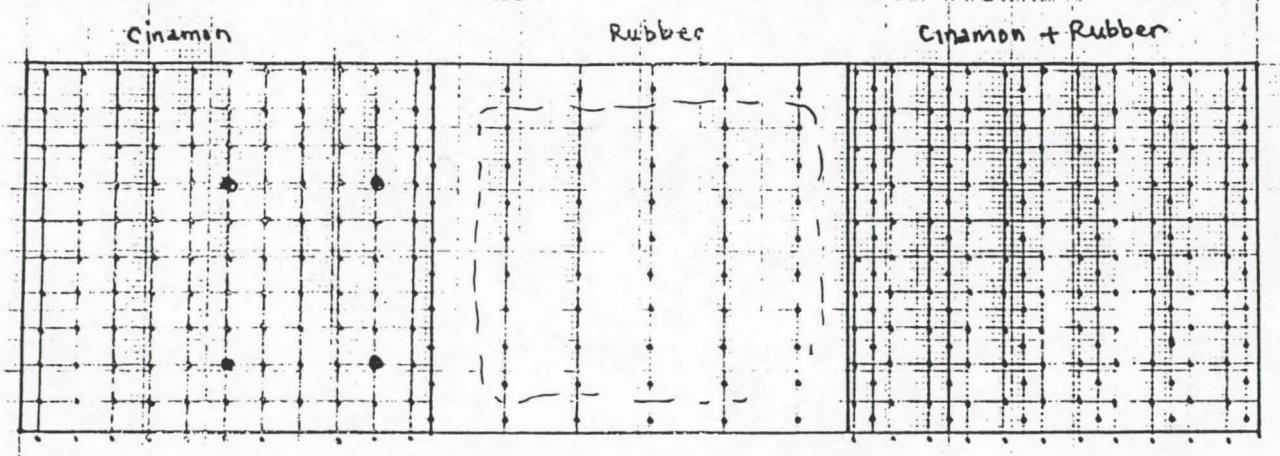
• : Rencana Penanaman Kayu Manis

• : Penanaman Karet.

Skala = 1:500

36 meter dari Batas Bench.

1.3. Pak. M. Noor RAS 2.5



- : Rencana penanaman Kayu Manis
- : Penanaman Karet.

Lokasi : S 1° 40.923'
T 101° 52.927'

skala = 1 : 500

TRIAL 2

Planting : 10/96

RICE EXPERIMENT in RAS 2.5 In 1996/97 at SMPT

2TREATMENTS / RICE VARIETY X RICE FERTILIZATION

TREATMENT 1 : RICE VARIETY
Variety 1 : SAIM (from Sembawa)
Variety 2 : improved variety (Wayararem or Jatiluhur)

TREATMENT 2 : RICE FERTILIZATION
Treatment : on fertilization : 3 levels
- dose 0
- dose BPS
- dose CRIFC

"BPS fertilization dose" is the economic dose recommended by BPS/Sembawa for JAMBI.
FERTILIZATION DOSE

DOSE IN KG/HA	UREA	SP 36	KCL
BPS	100	160	75

"CRIFC fertilization dose" is the dose recommended by CRIFC/Bogor for JAMBI.
FERTILIZATION DOSE

DOSE IN KG/HA	UREA	SP 36	KCL
CRIFC	150	220	150

The rice trial is surimposed on RAS 2.5 for the year of planting only.

DESIGN

REP 1	REP 2	REP 3
RUBBER ONLY **SAIM** **DOSE 0**	RUBBER +CINNAMON **SAIM** **DOSE BPS**	CINNAMON ONLY **WAYARAREM** **DOSE CRIFC**
CINNAMON ONLY **SAIM** **DOSE CRIFC**	RUBBER +CINNAMON **WAYARAREM** **DOSE BPS**	RUBBER ONLY ***no rice***
RUBBER +CINNAMON ***no rice***	RUBBER ONLY **WAYARAREM** **DOSE 0**	CINNAMON ONLY ***no rice***

randomized block system : 2 rep.

ANNEX 2

INPUTS REQUIREMENTS

FIRST SET OF TRIALS
PLANTING DECEMBER 1995

The GAKINDO/ICRAF SRAP PROJECT

JAMBI PROVINCE

RAS TRIALS PLOT CHARACTERISTICS AND CHOICE BY VILLAGES

FIRST SET OF TRIALS PLANTED IN DECEMBER 1995

MUARA BUAT Farmers	**TYPE** **RAS**	**Rep**	**AREA** **selected** in ha	***Slope***	***Status***	***associated perennials***
EFFENDI	2.5.1	1	0.3	50 %	Belukar 10 years old	presence of Imperata cinnamon
SANDY'PLOT	SPECIFIC		0.8	> 60 %	???	
M NOOR	2.5.1	2	0.3	50 %	half plot slashed in 93 *half plot slashed in april 95*	cinnamon
ALISRI	2.5.1	3	0.5	75 %	old belukar slashed in 95	Cinnamon
SARYONO 2 rep	1.1/weeding	1 & 2	0.8	> 60 %	secondary forest slashed in april 95	RAS 1 natural forest regrowth
BUSTAMI/K des	1.1/weeding	3	0.4	> 60 %	slashed in april 95 old jungle rubber	RAS 1 natural forest regrowth
TOTAL AREA Number of farmers			**3.1** 5			
RANTAU PANDAN Farmers				***Slope***	***Status***	***associated perennials***
YANI	2.2 palawija	5	0.5	20-30° %	Belukar	duku, Rambutan, durian
AZAHRI	1.1/weeding	4	0.4	15 %	10 years	RAS 1 natural forest regrowth
SMAEL	1.1/weeding	5	0.4	30-40 %	Belukar 5 years	RAS 1 natural forest regrowth
TOTAL AREA Number of farmers			**1.3** 3			
SEPPUNGUR Farmers				***intercrop***	***Status***	***associated perennials***
SAER	2.2 palawija/rice	1	0.45	Banana + cassava	old belukar	Durian, duku, rambutan, cempedak no cinnamon
SAPRI	2.2 palawija	2	0.3	Banana + cassava		Durian, duku, rambutan, cempedak no cinnamon
SABRAN	2.2 palawija	3	0.3	Banana + cassava		Durian, duku, rambutan, cempedak no cinnamon
ADNAN1	2.2/alang²	6	0.25	rice	Old jungle rubber S&B in 1994, alang²	Durian + duku
ADNAN2	2.2/alang²	7	0.25	rice	Old jungle rubber S&B in 1994, alang²	Durian + duku
ALIAS	2.2/rice	4	0.3	rice	belukar 3 years	Durian + duku
TOTAL AREA Number of farmers			**1.85** 5			

JAMBI PROVINCE

ON FARM TRIALS REQUIREMENTS

FIRST SET OF TRIALS PLANTED IN DECEMBER 1995 **PLANTING MATERIAL**

MUARA BUAT

FARMERS	TYPE RAS	RICE VARIETY	Rice planting date in 1995	Rubber planting date	Pohon lain + PTC planting date	AREA selected in ha	NB OF TREES PER FIELD 550	TYPE OF CLONES
Farmers					1996			
EFFENDI	2.5.1	no rice		december	january/march/sept cinnamon	0.3	165	GT1
SANDY'PLOT	SPECIFIC	no rice		december		0.8	440	PB260
M NOOR	2.5.1	no rice		december	january cinnamon	0.3	165	GT1
ALISRI	2.5.1	no rice		december	january/march cinnamon	0.5	275	GT1
SARYONO	1.1/weeding	no rice		december		0.8	440	PB 260
BUSTAMI/K des	1.1/weeding	no rice		december		0.4	220	PB 260
TOTAL AREA of Number of farmer						**3.1** 1		
RANTAU PAN farmers								
YANI YANI	2.2 palawija	soybean	january october	december	March/october	0.5	275	GT1
AZAHRI	1.1/weeding	local rice total failure	october	January		0.4	220	GT1
ISMAEL	1.1/weeding	o rice		december		0.4	220	GT1
TOTAL AREA of Number of farmer						**1.3** 4		
SEPPUNGUR armers		failure						
SAER	2.2 palawija	wayararem/local Sembawa	december	december	March	0.45	247.5	GT1
SAPRI	2.2 palawija	wayararem/local Sembawa	december	december	March	0.3	165	GT1
SABRAN	2.2 palawija	wayararem/local Sembawa	december	december	March	0.3	165	GT1
ADNAN	2.2/alang²	local	february 1996	december	???	0.25	137.5	GT1
ADNAN	2.2/alang²	local	february 1996	february 1996	???	0.25	137.5	PB 260
AKIAS	2.2/rice	local	december	december	March	0.3	165	GT1
TOTAL AREA of the village lumber of farmers						**1.85** 5		
TOTAL NUMBER OF FARMERS		**13**						
TOTAL AREA OF TRIALS		**6.25**						

JAMBI PROVINCE

ON FARM TRIALS REQUIREMENTS

1996 **FERTILIZATION** **OTHER INPUTS**

FIRST SET OF TRIALS PLANTED IN DECEMBER 1995

FARMERS	TYPE RAS	Fertilizer required in KG for RUBBER ONLY every 3 months			Fertilizer required in KG for RICE ONLY BPS DOSIS			CRIFC DOSIS			Upland rice varieties KG			SP 36 Phosphate for covercrops in 1996
MUARA BUAT		UREA	planting SP 36	KCL	UREA 100	SP 36 140	KCL 75	UREA 150	SP 36 220	KCL 150	LOCAL	SAIM	WAYA RAREM	0
Farmers														
EFFENDI	2.5.1	8												
Sandy's plot	SPECIFIC	22												
M NOOR	2.5.1	8												
ALISRI	2.5.1	14												
SARYONO	1.1/weeding	22												0
BUSTAMI/K des	1.1/weeding	11												0
TOTAL /village		**85**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
RANTAU PANDAN farmers														
YANI	2.2 palawija	14												
AZAHRI	1.1/weeding	11												0
ISMAEL	1.1/weeding	11												0
TOTAL /village		**36**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SEPPUNGUR farmers											rice seeds : kg/ha 50			
SAER	2.2 **palawija/rice**	12			15	21	11	17	33	23		30		
SAPRI	2.2 palawija	8												
SABRAN	2.2 palawija	8												
ADNAN	2.2/alang²	7												
ADNAN	2.2/alang²	7												
ALIAS	**2.2/rice**	8			10	14	8	11	22	15	August	20 october	october	
TOTAL /village Number of farmers		**51** every 3 months	**0**	**0**	**25**	**35**	**19**	**28**	**55**	**38**	**0**	**50**	**0**	**0**

INPUTS REQUIREMENTS

FIRST SET OF TRIALS PLANTED IN DECEMBER 1995		Fertilizer required in KG for RUBBER ONLY every 3 months			Fertilizer required in KG for RICE ONLY						Upland rice varieties KG			SP 36 Phosphate for covercrops in 1996
1996		1996 SEPTEMBRE UREA	DECEMBRE UREA		for 1 crop RICE UREA	BPS SP 36	KCL	UREA	CRIFC SP 36	KCL	LOCAL	SAIM	WAYA RAREM	0
TOTAL REQUIREMENT FOR JAMBI		172	172		25	35	19	28	55	38	0	50	0	0
TOTAL PER VILLAGE														
MUARA BUAT		85	85		0	0	0							
RANTAU PANDAN		36	36		0	0	0							
SEPPUNGGUR		51	51		25	35	19							

FERTILIZER REQUIRED in kg
FOR RUBBER AND RICE AND COVERCROPS
for Jambi 1995 planting (old trials)

SEPTEMBRE UREA	DECEMBRE UREA	SEPTEMBER SP 36	KCL
225	172	90	56

SECOND SET OF TRIALS
PLANTING OCTOBER 1995

NEW TRIALS PLANTING IN OCTOBER 1996

The GAKINDO/ICRAF SRAP PROJECT

JAMBI PROVINCE

RAS TRIALS PLOT CHARACTERISTICS AND CHOICE BY VILLAGES

SECOND SET OF TRIALS PLANTED IN OCTOBER 1996

SEPPUNGUR	TYPE RAS	REP	AREA selected	Slope	Status	associated perennials
			in ha			
Farmers 6 rep						
Sarhoni	1.1/weeding	1	0.4	flat	Old jungle rubber	no
Zulkifli	1.1/weeding	2	0.4	flat	Old jungle rubber	no
Aljufri	1.1/weeding	3	0.4	flat	Old jungle rubber + Coffee	no
Eman	1.1/weeding	4	0.4	flat	Old jungle rubber + Coffee	no
Azwar	1.1/weeding	5	0.4	flat	Old jungle rubber	no
Abdul Roni 1	1.1/weeding	6	0.4	10 %	Old jungle rubber	no
TOTAL			**2.4**			
SEPPUNGUR	clone comparison RAS 1.2/CC					
Taridi	RAS 1.2/CC	1	0.8		Secondary forest	no
Abdul Roni 2	RAS 1.2/CC	2	0.8	flat	Old jungle rubber	no
TOTAL			**1.6**			
M BUAT/R PANDAN						
Mawi Sutan 1	1.3/rubber fertilization	SPECIFIC	0.4	30-50 %	Old jungle rubber	no
Yusuf	RAS 1.2/CC/half	3/half	0.8	50-70 %	Secondary forest	no
Harahap	RAS 1.2/CC/half half	3/half	0.8	60-80 %	Secondary forest	no
M Dur	RAS 1.2/CC	4	0.8	30 %	Old jungle rubber	no
Mawi Sutan 2	RAS 1.2/CC	5	0.8	flat to 20 %	Old jungle rubber	no
TOTAL VILLAGE			**3.6**			
TOTAL			**7.6**			

The GAKINDO/ICRAF SRAP PROJECT

JAMBI PROVINCE

RAS TRIALS PLOT CHARACTERISTICS AND CHOICE BY VILLAGES

SECOND SET OF TRIALS PLANTED IN OCTOBER 1996

MUARA BUAT Farmers	TYPE RAS	Rep	AREA selected in ha	Slope	Status	associated perennials
STMP	RAS 2.5	1	0.45	flat	alang²/old rubber	cinnamon
STMP	RAS 2.5	2	0.45	flat	alang²/old rubber	cinnamon
STMP	RAS 2.5	3	0.45	flat	alang²/old rubber	cinnamon
TOTAL						

RICE EXPERIMENT ON RAS 2.5 In october/February 96/97 In SMP

FARMERS	TYPE RAS	RICE VARIETY	Rice planting date in 1995	Rubber planting date	Pohon lain + PTC planting date	AREA selected in ha	NB OF TREES PER FIELD 550	TYPE OF CLONES	NUMBER OF STUMPS per field 550
STMP	RAS 2.5	siam/wayararem	oct 96	oct 96	oct 96	0.45		PB 260	165
STMP	RAS 2.5	siam/wayararem	oct 96	oct 96	oct 96	0.45		PB 260	165
STMP	RAS 2.5	siam/wayararem	oct 96	oct 96	oct 96	0.45		PB 260	165

INPUTS REQUIREMENTS

SECOND SET OF TRIALS PLANTED IN OCTOBER 1996

FARMERS	PLOT	FERTILIZATION required in KG every 3 months december UREA	for RUBBER ONLY PLANTING october SP 36	KCL	RP
Farmers		AFTER 3 months december 96	october 96		
Sarhoni		11	44	0	
Zulkifli		11	44	0	
Aljufri		11	44	0	
Eman		11	44	0	
Azwar		11	44	0	
Abdul Roni 1		11	44	0	
TOTAL		**66**	**264**	0	
Taridi		22	88	0	
Abdul Roni 2		22	88	0	RP
Mawi Sutan 1	A/0	0	0	0	
	B/1ton RP	0	0	0	400
	C/urea	11	44	0	
	D/TCSDP	11	44	35	
Yusuf		22	88	0	
Harahap		22	88	0	
M Dur		22	88	0	
Mawi Sutan 2		22	88	0	
TOTAL		**154**	**616**	**35**	**400**

INPUTS REQUIREMENTS

SECOND SET OF TRIALS PLANTED IN OCTOBER 1996

FARMERS	PLOT	Fertilizer required in KG for RUBBER ONLY every 3 months			Fertilizer required in KG for RICE ONLY BPS DOSIS			CRIFC DOSIS			Upland rice varieties KG			SP 36 Phosphate for covercrops in 1996
MUARA BUAT		UREA	planting SP 36	KCL	UREA	SP 36	KCL	UREA	SP 36	KCL	LOCAL	SAIM	WAYA REREM	
					100	140	75	150	220	150				0
STMP	A	8	33	0								10	10	0
	B	for entire field			15	21	11					for entire field		
	C							23	33	23				
STMP	A	8	33	0								10	10	0
	B	for entire field			0	0	0					for entire field		
	C							3	5	3				
STMP	A	8	33	0								10	10	0
	B	for entire field			0	0	0					for entire field		
	C							1	1	1				
		25	99	0	15	21	11	26	39	26	0	30	30	0

TOTAL REQUIREMENTS FOR Augustus/October 1996

FERTIZER REQUIRED in kg
FOR RUBBER AND RICE AND COVERCROPS
for Jambi 1996 new planting (new trials)

SEPTEMBER UREA	december UREA	SEPTEMBER SP 36	KCL	SEPTEMBE RP	
41	**179**	**775**	**73**	**400**	

TOTAL FERTIZER REQUIRED in kg
FOR RUBBER AND RICE AND COVERCROPS
for Jambi 1996 old and new planting

	SEPTEMBER UREA	december UREA	SEPTEMBEF SP 36	KCL	SEPTEMBE RP	
OLD TRIALS	**225**	**172**	**90**	**56**		
NEW TRIALS	**41**	**179**	**775**	**73**	**400**	
TOTAL	**266**	**351**	**865**	**129**	**400**	
TOTAL TO BE ORDERED	**300**	**400**	**900**	**150**	**400**	
	500	500	500	500	200	TOTAL
COST	**150,000**	**200,000**	**450,000**	**75,000**	**80,000**	**955,000**

Upland rice varieties KG		
LOCAL	**SAIM**	**WAYA RAREM**
	80	30

ANNEX 3

PROGRAMME OF ACTIVITIES

PROGRAMME OF ACTIVITIES

FOR AUGUSTUS OCTOBER 1996

OLD TRIALS

RUBBER GROWTH: DATA RECORDING SEPTEMBER

Growth monitoring : according to growth monitoring protocol :

- record every 3 month :
    - diameter 10 cm above the grafting point.
    - number of whorl (distribution)
    - height

These measures are made on 30 trees per plots, excluding the borders. See each plot map. Number of missing trees, dead trees ; replacement of missing trees by trees in reserve in polybag in october at the next rainy season

Every 3 months. Data are collected by all staff with the help of STMP students. Data entry and analysis is under the responsability of Ratna.

LCC

Check LCC growth. If LCC failed, LCC may be replanted in October, in particular in Sariono's field.

FERTILISATION OF RUBBER

Fertilization programme : every 3 months after planting : supply of fertilizers according to TCSDP programme FOR UREA only (see table).

The fertilization of rubber in the RAS 1.3/rubber fertilization trial is directly under the responsability of Gerhardt.

WEEDING CONTROL

Control of weeding programme in each plots. See the table for each plot.
Monitor secondary forest regrowth :

- height of belukar (below/same height/above average rubber height).
- presence of Imperata
- presence of Mikania

Verify that the weeding treatments are well implemented in particular in Azari, Sariono and Bustami's fields.

BUKU BURUH (labour monitoring)

Control of buku buruh every month : check that all labour is correctly recorded.
Directly under the responsability of Iwan.

NEW TRIALS

FIRST PRIORITY : stacking of the fields for RAS 1.2/CC and sent the maps to Bogor.

- stacking for rubber and plots
- checking the holing
- distribution of inputs (fertilizers)
- planting as soon as stumps have 1 whorl.

NURSERY IN STMP FOR ASSOCIATED TREES AND STUMPS FROM GOODYEAR

List of trees allowed in RAS 2 : durian, rambutan, duku, jengkol, tangkill (melinjau), petai, manga, other fruits and timber trees.
Prepare a nursery in STMP with 500 trees.

ACTIVITIES PER FIELDS

PAK SAER
URGENT
- do a map with existing trees in the plot, send it to EP
- map of all trees present in the plo.
- chek all palawijas, vegetables grown in the field and put it on the map.
- Select 30 seedlings to be monitored for growth as a control outside the RAS 2.2 plot, onthe left hand side.

PAK SAPRI
- map of all trees present in the plo.
- chek all palawijas, vegetables grown in the field and put it on the map.

PAK SABRAN
- map of all trees present in the plo.
- chek all palawijas, vegetables grown in the field and put it on the map.
- Rubber seedlings should be urgently moved to another place.

PAK YANI
- map of all trees present in the plo.
- chek all palawijas, vegetables grown in the field and put it on the map.

Monitoring of ALL rubber growth every 3 months.
Monitoring of associated trees nursery and planting. Check the available trees to be planted.

IBU ALIAS and PAK SAER
Prepare the stacking for rice experiment (3 plots).

Pak ADNAN
Control the weeding in the row : no weeding in the inter-row.

RAS 2.5 in MUARA BUAT
CINNAMON GROWTH MONITORING
Measure the diameter of 30 trees/plot every 6 month (at the same time as rubber) at 10 cm above ground level. See map.

BUDWOOD GARDEN PROGRAMME
Control the stacking and the planting
Establishment of a contract for stumps production.

monitor % mati

ANNEX 4

BUDWOOD GARDEN PRODUCTION

BUDWOOD GARDEN PRODUCTION CAPACITY
PRIVATE SRAP budwood garden
IN JAMBI

CLONE	NB OF PLANTS	PRODUCTION OF BUDWOOD in meters YEAR 1	2	3 and +	POTENTIAL PRODUCTION OF STUMPS 1	2	3 and +
PB 260	150	150	300	450	750	1500	2250
RRIC 100	100	100	200	300	500	1000	1500
BPM 1	80	80	160	240	400	800	1200
RRIM 600	80	80	160	240	400	800	1200
TOTAL/year	**410**	**410**	**820**	**1230**	**2050**	**4100**	**6150**

Production of stumps : with 10 buds /meter of budwood and 50 % of grafting success.

A maximum of 2000 stumps may be sold the first year, 4000 the 2nd year and 6000 the third year and after.

ANNEX 5
INPUTS REQUIREMENTS AND BUDGET

AUGUSTUS 1996

BUDGET FOR SRAP IMPLEMENTATION IN JAMBI PROVINCE IN Augustus/October 1996

INPUTS FOR TRIALS ESTABLISHMENT AND IMPLEMENTATION

ITEMS	NUMBER	COST per item	TOTAL COST
PLANTING MATERIAL			
Rubber clones GT1 FOR REPLACEMENTS	100	1,200	120,000
cinnamon trees for RAS 2.5 and Effendi	1,400	500	700,000
Rubber seedlings for RAS 1.2/CC	800	150	120,000
ASSOCIATED TREES NURSERY			200,000
polybags			50,000
seeds			200,000
Transportation COSTS			2,000,000
INPUTS			
Poisons for pigs			300,000
pesticides/insecticides for rice			100,000
traps for pigs from Padang	100	3,500	350,000
Extra labour for growth monitoring (mandays)	50	5,000	250,000
TOOLS			
1 sprayer	1	150,000	150,000
Mini sprayer	15	2,500	37,500
Dithane	15	10,000	150,000
Round-up	10	25,000	250,000
Curater (for rice in october)	10	20,000	200,000
Grafting knifes	4	15,000	60,000
Signs and labels for trials information			2,000,000
sticks and paint			200,000
Fertilizers for RAS			955,000
P TRIAL			
RAS 1 labour cost for weeding			200,000
RAS 1/Nutrient management/P trial			
Trench experiment			
INPUTS	3	1200000	3,600,000
Miscealanous			1,000,000
TOTAL			**13,192,500**